Chapter Four

Placing SDWA Cost Estimates in Context

Examining the magnitude of the cost of treating drinking water is useful, but it is important to place those costs in an appropriate context as well. In the following discussion, the Congressional Budget Office compares the cost estimates for drinking water treatment with available data on benefits. That comparison reveals that costs relative to benefits vary widely among contaminants and system sizes and in some cases appear extremely large--for example, more than $4 billion per cancer case avoided. In addition, CBO considers treatment costs relative to other costs facing drinking water systems. Finally, CBO compares local estimates of the cost of complying with the Safe Drinking Water Act with local measures of fiscal capacity. That comparison reveals that the cost of treating drinking water according to the standards specified under the existing rules of the SDWA is expected to impose a modest fiscal burden on most municipalities.

Costs Relative to Benefits

Whether costs of a regulation are "too large" or not depend, of course, on the benefits that result from the regulation. Regulations are generally thought to be too costly when the cost of complying with them exceeds the value of the benefits received. However, measuring costs and benefits can be very difficult.

Information on the benefits associated with the SDWA is limited. CBO used information available in Environmental Protection Agency documents and applied a consistent method to calculate the cost per cancer case avoided from several carcinogens that are regulated, or proposed to be regulated, under the SDWA (see Table 4). The cost per cancer case avoided varies enormously among contaminants. For example, the cost per cancer case avoided averaged for all water systems varies from $0.5 million under the standard for the pesticide ethylene dibromide and co-contaminants to $4.3 billion for regulating the pesticides atrazine and alachlor under the Synthetic Organic Compounds (SOCs) Rule.

In addition, the cost per cancer case avoided generally declines (sometimes drastically) as the size of the system increases. For example, the cost per cancer case avoided as a result of regulating 1,2 dichloropropane falls from $135 million for the category for the smallest-sized systems to $13.2 million for systems serving between 10,000 and 25,000 people. That decline primarily takes place because unit treatment costs decrease as system size increases.

Two of the proposed regulations are expected to reduce the risk of cancer: the Disinfectants/Disinfection By-Products Rule and the Radionuclides Rule. However, the EPA is uncertain about how much the risk of cancer would be reduced by the proposed D/DBP rule. Based on differing estimates about the baseline cancer risk associated with disinfection by-products, the EPA estimates that the average cost per cancer case avoided ranges between $867,000 and $8.67 billion in the initial stage of the

Table 4.
Cost per Health Effect Avoided for Selected Rules and Contaminants (In millions of 1992 dollars)

Rule/Contaminant	System Size (People served) 25 to 100	100 to 500	500 to 1,000	1,000 to 3,300	3,300 to 10,000	10,000 to 25,000
Carcinogens						
Radionuclides (Proposed)						
Radon: MCL = 300 pCi/L						
Cases avoided (Per year)	8.41	25.74	6.26	13.01	6.6	6.23
Cost per case avoided	8.9	4.0	5.5	2.7	1.9	1.5
Radium-226: MCL = 20 pCi/L						
Cases avoided (Per year)	0.000485	0.001306	0.001047	0.001458	0.37	0.87
Cost per case avoided	663.1	255.4	80.8	170.8	22.1	12.0
Radium-228: MCL = 20 pCi/L						
Cases avoided (Per year)	0.00016	0.000492	0.010422	0.019338	0.05	0.05
Cost per case avoided	754.2	245.7	91.4	62.8	40.9	36.8
Adjusted gross alpha emitters: MCL = 15 pCi/L						
Cases avoided (Per year)	0.001253	0.01	0.02	0.05	0.04	0.19
Cost per case avoided	1,047.8	173.3	191.6	145.4	115.5	63.7
Volatile Organic Compounds (All combined)						
Cases avoided (Per year)	0.21	0.55	0.62	1.45	2.83	3.66
Cost per case avoided	59.0	18.3	10.0	5.3	2.6	1.5
Synthetic Organic Compounds						
EDB and co-contaminants						
Cases avoided (Per year)	2.223	7.108	7.314	15.369	20.167	19,652
Cost per case avoided[a]	2.2	0.8	0.5	0.4	0.4	0.3
1,2 dichloropropane						
Cases avoided (Per year)	0.0054	0.0166	0.017	0.0358	0.047	0.0458
Cost per case avoided[a]	135.5	47.6	25.7	19.7	18.1	13.2
Atrazine and alachlor						
Cases avoided (Per year)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Cost per case avoided	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Noncarcinogens (Acute effects)						
Surface Water Treatment Rule						
Cases avoided (Per year)	222	925	1,972	5,423	11,882	12,517
Cost per case avoided (In thousands of dollars)	161.1	32.3	12.2	7.5	6.8	3.9

(Continued)

Table 4.
Continued

Rule/Contaminant	System Size (People served) 25,000 to 50,000	50,000 to 75,000	75,000 to 100,000	100,000 to 500,000	500,000 to 1 Million	More than 1 Million	Average for All Systems
Carcinogens							
Radionuclides (Proposed)							
Radon: MCL = 300 pCi/L							
Cases avoided (Per year)	4.64	2.44	0.73	4.11	1.3	0	79.46
Cost per case avoided	1.4	1.3	1.4	1.2	1.4	a	3.6
Radium-226: MCL = 20 pCi/L							
Cases avoided (Per year)	0.65	0.34	0.1	0.58	0.18	0	3.1
Cost per case avoided	13.4	12.3	13.5	12.5	16.6	a	14.2
Radium-228: MCL = 20 pCi/L							
Cases avoided (Per year)	0.03	0.01	0.004399	0.029058	0.00706	0	0.210914
Cost per case avoided	41.5	46.2	16.5	35.1	75.7	0	45.5
Adjusted gross alpha emitters: MCL = 15 pCi/L							
Cases avoided (Per year)	0.19	0.11	0.08	0.32	0.18	0.22	1.4
Cost per case avoided	56.8	62.3	12.4	13.2	8.7	0.6	39.5
Volatile Organic Compounds (All combined)							
Cases avoided (Per year)	3.24	1.63	0.79	6.12	3.04	3.85	27.99
Cost per case avoided	1.1	1.1	1.1	0.8	0.8	1.0	2.4
Synthetic Organic Compounds							
EDB and co-contaminants							
Cases avoided (Per year)	0	0	0	0	0	0	71.833
Cost per case avoided[a]	b	b	b	b	b	b	0.5
1,2 dichloropropane							
Cases avoided (Per year)	0	0	0	0	0	0	0.1676
Cost per case avoided[a]	b	b	b	b	b	b	24.6
Atrazine and alachlor							
Cases avoided (Per year)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.0024
Cost per case avoided	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	4,258.0
Noncarcinogens (Acute effects)							
Surface Water Treatment Rule							
Cases avoided (Per year)	12,236	9,819	10,669	7,970	5,296	4,263	83,194
Cost per case avoided (In thousands of dollars)	2.8	2.7	3.3	10.7	10.0	22.8	7.1

SOURCE: Congressional Budget Office based on data from the Environmental Protection Agency.

NOTES: All capital costs were annualized over a 20-year period using a 7 percent interest rate.

MCL = maximum contaminant level; pCi/L = picocuries per liter; EDB = ethylene dibromide; n.a. = not available.

a. Monitoring costs were not included in these calculations.

b. Not applicable.

rule. In the extended stage, the incremental cost per cancer case avoided is expected to be between $840,000 and $19 billion.[1]

In some cases, the proposed standards for radionuclides may result in extremely high costs per cancer case avoided. For example, the standard proposed for adjusted gross alpha emitters (which is primarily designed to reduce the risk of exposure to the radionuclide polonium-210) would cost more than $1 billion per cancer case avoided for systems in the smallest-sized category.

Although considering the costs per cancer case avoided is useful, it is important to realize that those estimates are highly uncertain. They are based on the best available data, but those data are limited. For example, the occurrence data used in estimating the cost per cancer case avoided for the SOCs are not based on a nationwide survey. Those data indicate where and at what levels a contaminant is expected to be found. A nationwide estimate of occurrence was obtained by piecing together many sources of information (none of which was designed to be representative at the national level) and by using considerable judgment.[2] Given that uncertainty, the actual costs per cancer case avoided could either exceed or fall below the estimates provided.

Unfortunately, CBO does not have sufficient information to provide ranges--which would account for the uncertainty--around most of the estimates of costs per cancer case avoided.[3] However, unless the uncertainty is great enough to reduce the cost per cancer case avoided by a factor of 10 or more, the cost per cancer case avoided for some contaminants--or for some categories of system sizes--will be greater than the amount that is generally thought of as reasonable. For example, two reviews of studies that measure the value that individuals place on an avoided statistical death found that the values ranged between $0.6 million and $10.9 million in 1992 dollars.[4]

Extremely large costs per cancer case avoided, however, would not necessarily result in extremely large cost savings if the standard was eliminated. For example, although the cost per cancer case avoided for the standard for atrazine and alachlor is estimated at more than $4 billion, the total cost of meeting that standard (for all systems) is estimated at $10.2 million. The high cost per cancer case avoided in this case is the result of the extremely small number of cases avoided (0.0024 per year) rather than a very high level of expenditures.

Noncarcinogens can be grouped into two types of health effects--acute and chronic sublethal. Acute adverse health effects addressed by drinking water regulations fall into two major categories: those from exposure to microbial contaminants, such as giardia and cryptosporidium, and those from exposure to chemical substances.[5] One of the main acute health effects of concern from exposure to microbial contaminants is gastrointestinal disorders, such as gastroenteritis.[6] The symptoms may range from mild

1. Environmental Protection Agency, *Regulatory Impact Analysis of Proposed National Primary Drinking Water Regulations: Disinfectants/Disinfection By-Products Rule* (May 1994), p. 5-7.

2. Environmental Protection Agency, *Regulatory Impact Analysis of Proposed National Primary Drinking Water Regulations for Synthetic Organic Compounds* (April 1989), p. 1-2.

3. The one exception to this situation is radon. Based on EPA data, the number of cancer cases avoided because of the proposed standard for radon could range from 37 to 243. See Environmental Protection Agency, *Report to the United States Congress on Radon in Drinking Water* (February 1994), p. 7-14. That range of cancer cases avoided results in costs per cancer case avoided (averaged for all systems) that range from $7.6 million to $1.1 million. If the American Water Works Association's estimate of the annual cost of meeting the radon standard is used, then the cost per cancer case avoided would lie between $52 million and $7.9 million.

4. See Ann Fisher, Loraine G. Chestnut, and Daniel M. Violette, "The Value of Reducing Risks of Death: A Note on New Evidence," *Journal of Policy Analysis and Management*, vol. 8, no. 1 (Winter 1989), pp. 88-100; and W. Kip Viscusi, "Mortality Effects of Regulatory Costs and Policy Evaluation Criteria," *Rand Journal of Economics*, vol. 25, no. 1 (Spring 1994), pp. 94-109.

   In addition, recent research has examined whether regulations that reduce risks directly (for example, by decreasing the level of contaminants in drinking water) can cause offsetting increases in risk by lowering the income that individuals have to spend on health. This research indicates that regulation that costs more than $50 million per life saved can have an adverse effect on mortality because of the offsetting effect. See Viscusi, "Mortality Effects of Regulatory Costs and Policy Evaluation Criteria."

5. Environmental Protection Agency, *Total Benefits and Total Costs Associated with Implementation of the 1986 Amendments to the Safe Drinking Water Act* (March 1990), p. 2-8.

6. Gastroenteritis is an inflammation of the stomach and intestine. It can result in loss of appetite, nausea, vomiting, cramps, and diarrhea.

to severe and incapacitating and generally last from one to four weeks. In some cases, gastrointestinal disorders caused by microbial exposure may result in death, particularly for individuals with weakened immune systems. The Surface Water Treatment Rule is aimed at avoiding exposure to microbial contaminants in surface water systems.

As is the case with carcinogens, the cost per avoided acute health effect varies by system size under the Surface Water Treatment Rule (SWTR), with the largest costs incurred by the smallest systems (see Table 4). Unlike the carcinogens that were examined, the lowest cost per case avoided occurs in medium-sized systems. In the original analysis of the SWTR, the estimated economic cost associated with waterborne giardiasis was based on a study of costs incurred during an outbreak of waterborne giardiasis in 1983 that occurred in Scranton, Pennsylvania. That study estimated that the medical cost and the cost of time lost from work were in the range of $1,678 to $2,532 per case (measured in 1992 dollars).[7] If those medical costs and lost wages are used as a measure of the benefits of avoided incidences of gastroenteritis obtained by waterborne giardia, the cost per case avoided exceeds the benefits in all categories of system sizes.

The proposed Enhanced Surface Water Treatment Rule is designed to provide increased protection from infection resulting from microbial contaminants. The general public's concern about the risk from microbial contaminants increased significantly following an outbreak of waterborne disease in Milwaukee, Wisconsin, in 1993. That outbreak was caused by the presence of cryptosporidium. As a result of the outbreak, 400,000 people suffered stomach upsets and diarrhea and 104 people died. Although the Milwaukee incident drew public attention to the threat posed by cryptosporidium, the EPA's analysis of the costs and benefits of the proposed ESWT rule is based on the extent to which it will result in the control of giardia, not cryptosporidium.

The EPA has focused on giardia because severe deficiencies in data (resulting, in part, from analytic problems in measuring the presence of cryptosporidium) limit the EPA's ability to evaluate treatment techniques that might control cryptosporidium or to predict the extent to which the proposed ESWT rule would decrease the presence of cryptosporidium. The EPA is currently working on an analytic method that will allow water systems to detect the presence of cryptosporidium. In addition, it has proposed a rule on collecting information (the Information Collection Rule) that will provide much better data on the presence of microbial contaminants and hence the ultimate costs and benefits of the ESWT rule.

Based on the limited data that are currently available, the EPA estimates that the initial phase of the rule (which will apply only to systems serving more than 10,000 people) will cost $391 million per year and reduce the number of cases of giardia infection by 400,000 to 500,000.[8] That range in the number of cases of giardia infections avoided results in an average cost of between $978 and $782 per case avoided. Based on that information, the average cost per case avoided by the proposed rule would be less than the measures of benefits described above.

The proposed ESWT rule (in the initial phase) is expected to result in a more favorable benefit-to-cost ratio than the SWTR for two reasons. First, given current information, the SWTR appears to have been based on an underestimate of the extent of microbial risk. That underestimate would, therefore, result in an overestimate of the cost per case of waterborne disease avoided. Second, microbial risks may increase from treatment modifications undertaken to comply with tighter standards for disinfection by-products.[9] It is important to understand that the measures of cost per case avoided in both the SWTR and the ESWT rule are based on limited data on the actual incidence of waterborne diseases. In both cases, incidence is predicted using samples that were not designed to represent the nation as a whole.

7. Environmental Protection Agency, *Regulatory Impact Analysis for the National Primary Drinking Water Regulations: Interim Enhanced Surface Water Treatment Rule* (May 25, 1994), p. 1-7.

8. Ibid., pp. 1-3 to 1-7.

9. Ibid.

Only a few chemical contaminants are regulated based primarily on their acute effects--for example, nitrate, nitrite, copper, and sulfate. Only sulfate, however, is estimated to be present at levels for which establishing a maximum contaminant level (MCL) will result in avoiding cases of acute adverse effects. The primary adverse effect associated with sulfate is diarrhea. That effect appears to be transient: exposed individuals become acclimated to high sulfate levels over time.[10] The EPA does not report the cost per avoided acute health effect expected under the proposed regulation for sulfate because of inadequate data on the relationship between exposure and incidence of diarrhea.[11]

The EPA has been unable to develop estimates of "cases avoided" for contaminants regulated on the basis of chronic sublethal health effects. The primary reason cited for the lack of such estimates is the "absence of accepted dose-response relationships to allow for the determination of the number of cases of a particular adverse health effect caused by different exposure levels."[12] As an alternative, the EPA has examined the number of people whose exposure will be reduced from a level above an MCL to a level in compliance with an MCL as a result of a regulation. The EPA has examined the cost per reduction in exposure to three contaminants--cadmium, fluoride, and lead.[13] That examination revealed large differences in the cost of reductions in exposure among contaminants and among different-sized systems.

Evaluating the cost of reduced exposure and comparing such costs among contaminants is difficult, however, for two reasons. First, the reduction in adverse health effects that will result from decreased exposure is unknown. Second, the types of adverse health effects from different contaminants vary widely. For example, the major chronic health effect from exposure to cadmium involves the kidney, whereas exposure to lead is particularly problematic for children and can result in numerous effects, including delayed neurological and physical development, impaired cognitive development, adverse reproductive effects, and interference with vitamin D metabolism.[14] Because of the inability to attach meaningful evaluations to costs per reduction in exposure, those data are not presented.

Ideally one should compare the incremental benefits of a federal mandate with the incremental costs. In other words, the costs associated with each treatment that communities would not have undertaken in the absence of federal drinking water standards would be compared with the benefits of that treatment. Unfortunately, available data do not permit CBO to make such a comparison. Given the extremely high cost per cancer case avoided for some contaminant and size categories, however, some of those treatments would probably never have been undertaken without federal requirements.

The large variation in costs relative to benefits among different-sized systems and contaminants is not surprising given the process by which the EPA sets drinking water standards. First, the EPA establishes maximum contaminant level goals (MCLGs). "MCLGs are nonenforceable health-based goals which are set at the level at which no known or anticipated adverse effects on the health of persons occur and which allows an adequate margin of safety."[15] Next the SDWA directs the EPA to set the enforceable MCL as close to the MCLG as is feasible, "taking costs into consideration." The legislative history of the SDWA, however, directs the EPA to base feasibility on what is affordable to large systems.[16] Given that large systems generally have lower unit treatment costs than small systems, that process will inevitably result in smaller systems' having higher costs per health effect avoided than larger systems do. In addition, although the SDWA directs the EPA to take costs into account in determining the feasibil-

10. Environmental Protection Agency, *Total Benefits and Total Costs Associated with Implementation of the 1986 Amendments to the Safe Drinking Water Act*, p. 2-8.

11. Environmental Protection Agency, *Regulatory Impact Analysis for the National Primary Drinking Water Regulations: Sulfate* (August 31, 1994).

12. Environmental Protection Agency, *Total Benefits and Total Costs Associated with Implementation of the 1986 Amendments to the Safe Drinking Water Act*, p. 2-5.

13. Ibid., p. 5-3.

14. Ibid., p. 2-6.

15. Environmental Protection Agency, *Technical and Economic Capacity of States and Public Water Systems to Implement Drinking Water Regulations* (September 1993), p. 22.

16. Ibid.

ity of meeting a standard, it does not direct the EPA to weigh the cost of meeting a standard against the anticipated benefits.

Treatment Costs Relative to Other Cost Factors

As discussed above, meeting drinking water standards may impose a large per-household cost on some systems, particularly small systems. But treatment is only one of the multiple costs that water systems bear. According to the National Regulatory Research Institute, the need to replace and upgrade an aging water delivery system and the need to meet growing water demand associated with population growth and economic development are expected to be the primary factors increasing the cost of water in the foreseeable future.[17] Based on trends established during the 1971-1991 period, CBO projected that capital expenditures by drinking water systems over the 1992-2012 period would total $220 billion in 1992 dollars.[18] In comparison, the EPA estimates that $8.8 billion in 1992 dollars in capital expenditures will be necessary to meet the standards set by the existing SDWA requirements. However, the cost of proposed rules could add more than $17 billion in additional capital requirements based on the EPA's estimates and $24.3 billion based on the American Water Works Association's estimates.[19]

As discussed above, the EPA estimates that the annual cost (for both capital and operations and maintenance) of meeting the standards set by the existing SDWA regulations will be $1.4 billion. The AWWA projects that cost to be $2.3 billion (or $4.1 billion, if the costs of meeting all the Phase II standards are included). Those costs can be compared with total national expenditures of $28.6 billion in 1991 (measured in 1992 dollars) for providing community drinking water--that is, they represent 5 percent to 8 percent of total expenditures on drinking water. The EPA's estimate of the total annual cost of meeting existing and proposed standards (in their extended form) is $5.4 billion, or 19 percent of total community drinking water expenditures in 1991.

The AWWA's estimate of the cost of meeting existing and proposed standards is $8 billion, or 28 percent of total drinking water expenditures in 1991.[20] Because the cost of providing drinking water is moving upward over time, the actual percentage of total expenditures required to treat drinking water according to SDWA standards should be less than indicated here. For example, based on current trends, total expenditures on drinking water would be $34 billion in 2001.[21] Based on that estimate, the cost of treating drinking water according to the levels specified by existing and proposed standards (in their extended form) would be 16 percent of total drinking water expenditures based on EPA data and 23 percent based on AWWA data.

17. National Regulatory Research Institute, *Meeting Water Utility Revenue Requirements: Financing and Ratemaking Alternatives* (November 1993), p. 13.

18. Projections were made based on Bureau of the Census data on capital expenditures by publicly owned community water systems. CBO increased the data by 19 percent to account for the expenditures of privately owned community water systems. That adjustment was based on information from the EPA's Federal Reporting Data System and is consistent with the approach used by the Environmental Protection Agency.

19. The EPA estimates that the proposed radon rule will result in $1.6 billion in additional capital requirements. In addition, it estimates the capital requirements associated with the D/DBP rule and the ESWT rule to be $11.2 billion and $4.5 billion, respectively. The AWWA estimates that the radon rule will result in $8.6 billion in additional capital expenditures. The D/DBP rule and the ESWT rule were developed using a negotiated rule-making process in which the AWWA and EPA worked together. Consequently, the AWWA did not develop independent estimates.

20. That figure includes the AWWA's estimate of complying with all of the new standards established following the 1986 amendments ($2.3 billion), the AWWA's estimate of the cost of the proposed radon rule ($1.9 billion), the joint EPA and AWWA estimate of the ultimate annual cost of the D/DBP rule ($2.6 billion) and the ESWT rule ($0.9 billion), the EPA's estimate of the annual cost of the proposed Sulfate Rule ($80 million), and the EPA's estimates of the cost of the proposed Radionuclides Rule other than for radon ($191 million).

21. The $34 billion estimate was obtained by assuming that total expenditures continue to rise at the rate established over the 1957-1991 period.

Local Cost Estimates of the Safe Drinking Water Act Compared with Fiscal Capacity

Identifying costs on a per-household basis is one step toward understanding the magnitude of the burden that SDWA regulations place on local governments and their residents. An additional step is to place those costs in the context of the fiscal burden that it places on the community.

Critics of unfunded mandates argue that they impose too large a fiscal burden on local communities. The measure of fiscal burden that has been frequently used to make this argument, however, is misleading. Many case studies of unfunded mandates compare the cost of complying with environmental requirements to the municipality's budget, either total budget or locally raised revenues.

Yet both of those measures can be deceptive. The types of services that municipalities provide vary greatly and, therefore, so do the sizes of their budgets and the amount of revenue that they collect. For example, some cities fund elementary and secondary schools, and others do not. Some operate hospitals, and others do not. The share of a budget (or of local revenues) that complying with a mandate requires may say more about the type of services that a municipality provides than about the cost of compliance. Municipalities that spend a higher share of their budget to comply with a mandate do not necessarily have a larger burden than those that spend a smaller share of their budget. They may just provide fewer other services.

Comparing cost estimates with a municipality's "fiscal capacity" rather than its spending or revenues is a better indicator of burden. Measures of fiscal capacity should ideally reflect the municipality's potential to raise revenue, rather than the amount of revenue that it actually raises. Municipalities have the potential to raise revenue from both residents and nonresidents. The potential to raise revenue from residents is based on the residents' income or assessable wealth. The potential to raise revenue from nonresidents depends on the municipalities' ability to tax nonresidents through such mechanisms as business property taxes, local sales taxes, and earnings taxes.[22]

Over 95 percent of all public water systems finance their system by user fees, or direct charges to their customers, and nearly all systems with more than 10,000 customers do so.[23] Although nearly all systems rely on user fees as a source of revenue, some systems may supplement that revenue by general tax revenue. Unfortunately, data on how much supplementing occurs are not available.

Because systems may use a combination of user fees and property taxes to finance SDWA expenses, CBO examined two alternative measures of fiscal burden as a means of placing the costs reported by the municipal expenditure survey in context. The first measure looks at the per-household cost of treating drinking water according to SDWA standards relative to median household income. That measure reflects the municipality's ability to raise revenue through user fees. The second measure of fiscal burden looks at the per-household cost of treating drinking water according to SDWA standards relative to the average residential property values in the municipality. That measure may reflect not only residents' wealth but also the municipality's potential to tax nonresidents.[24]

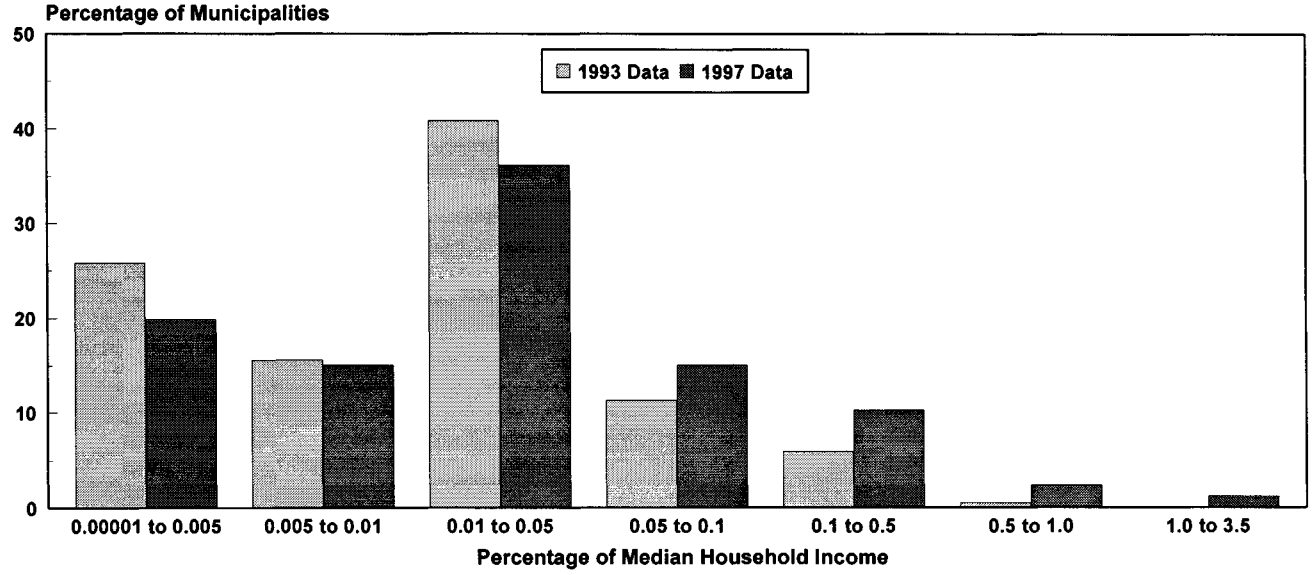
For 1993, none of the municipalities included in the subset of municipal expenditure survey respondents used by CBO reported per-household SDWA compliance costs for the existing rules that exceeded 1 percent of median household income. Over 93 per-

22. Helen Ladd and John Yinger, *America's Ailing Cities: Fiscal Health and the Design of Urban Policy* (Baltimore: Johns Hopkins University Press, 1991).

23. Environmental Protection Agency, *Final Descriptive Summary: 1986 Survey of Community Water Systems* (October 1987), p. 33, and American Water Works Association, *Water Industry Data Base* (Washington, D.C.: AWWA, 1992), p. 65, indicate that all systems that serve more than 10,000 customers charge user fees. However, neither survey covers all systems in that size category.

24. See Helen Ladd, Andrew Reschovsky, and John Yinger, "City Fiscal Condition and State Equalizing Aid: The Case of Minnesota," in National Tax Association/Tax Institute of America, *Proceedings of the Eighty-Fourth Annual Conference on Taxation, 1991* (Columbus, Ohio: NTA-TIA, 1992), pp. 42-49.

Figure 7.
Distribution of Municipalities by Average Per-Household Cost of Treating Drinking Water According to Existing SDWA Standards as a Share of Median Household Income



SOURCE: Congressional Budget Office calculations based on data from the Environmental Protection Agency, the Bureau of the Census, and the municipal expenditure survey commissioned by the U.S. Conference of Mayors and the National Association of Counties.

NOTES: SDWA = Safe Drinking Water Act.

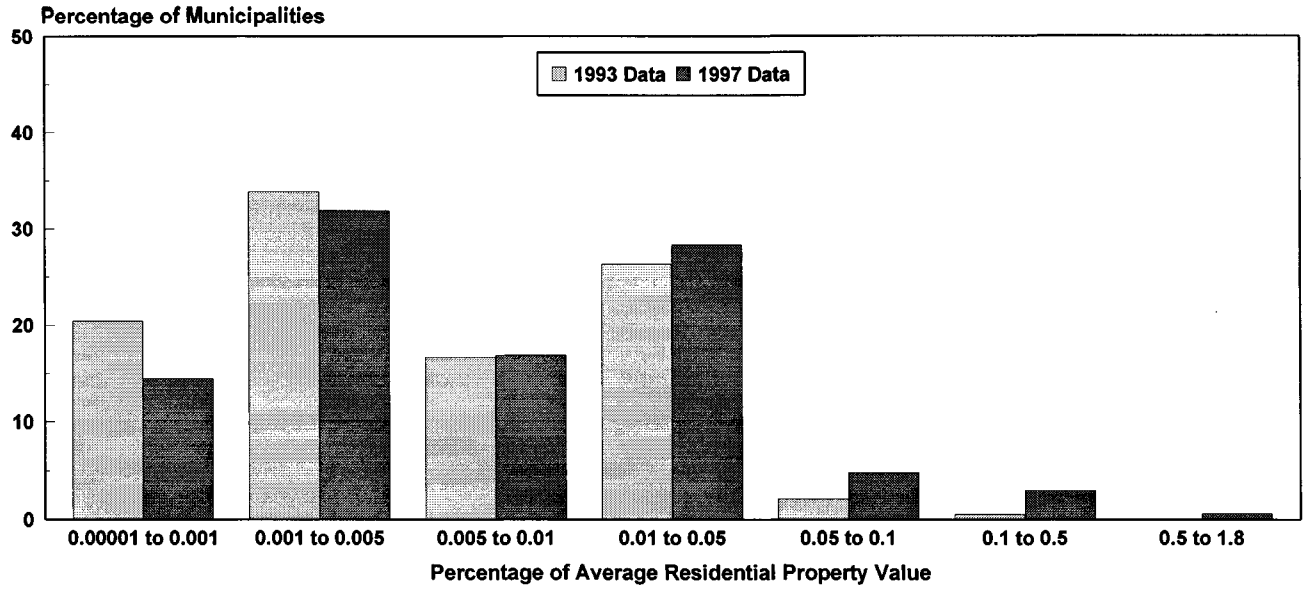
The figure compares 1993 and 1997 expenditure data from the municipal expenditure survey with 1990 data on median household income from the Bureau of the Census.

cent of municipalities had per-household costs that were less than 0.1 percent of median household income (see Figure 7). For 1997, two municipalities--or 1.2 percent of the 166 municipalities for which data were available--projected per-household costs of complying with existing rules that exceeded 1 percent of median household income. The remaining communities reported per-household costs that were less than 1 percent of median household income. Furthermore, over 87 percent of communities reported costs that were less than 0.1 percent of their median household income.

For 1993, over 99 percent of the municipalities reported per-household SDWA compliance costs for the existing rules that were less than 0.1 percent of their average residential property value (see Figure 8). For 1997, the number of municipalities projecting a cost that was less than 0.1 of their average residential property value fell to 96 percent. One municipality (0.6 percent of the 166 municipalities for which data were available) projected a cost that was 1.8 percent of its average residential property value.

The cost of meeting SDWA standards relative to median household income is a useful summary measure of fiscal burden for a municipality. It does not depict, however, the full distribution of burden experienced by individual households. Because some households may have income levels that are well below the median, increases in user fees will place a larger burden on them than the summary statistic indicated. Similarly, households with incomes that are above the median value will experience a fiscal impact that is less than that indicated by the summary statistic. Costs that are passed on to households in the form of property taxes do not share that characteristic because property taxes are levied as a percentage; in short, households with lower property values will pay a smaller amount. Because of that difference, the share of drinking water treatment costs that are passed on to households in the form of

Figure 8.
Distribution of Municipalities by Average Per-Household Cost of Treating Drinking Water According to Existing SDWA Standards as a Share of Average Residential Property Value



SOURCE: Congressional Budget Office calculations based on data from the Environmental Protection Agency, the Bureau of the Census, and the municipal expenditure survey commissioned by the U.S. Conference of Mayors and the National Association of Counties.

NOTES: SDWA = Safe Drinking Water Act.

The figure compares 1993 and 1997 expenditure data from the municipal expenditure survey with 1990 data on average residential property values from the Bureau of the Census.

user fees will be more regressive--that is, they will affect low-income households proportionately more than high-income households--than costs that are passed on to households through residential property taxes.